

The science objectives of this flight were to 1) characterize the convective lifecycle of continental convection, 2) Collect boundary layer aerosol and chemical properties in the convective region before convection began, 3) characterize the radiative properties of cirrus outflow in coordination with the ER2, 4) Collect correlative data with the SPEC Learjet and ER2.

We arrived in the region west of Jackson, Mississippi in the late morning hours finding a nearly cloud-free region to the south with developing cumulus in the northern section of the study area. The early part of the flight was to sample the pre convection boundary layer. We arrived at the pattern at 2500 feet and could not get lower because of airspace restrictions (wildlife areas). We worked the pattern in such a way that we coordinated with the ER2 on the N-S leg when it arrived. The southern part of the rosette was pretty much cloud free but it seemed we were in the boundary layer given the sensible turbulence we were experiencing. The northern section of the rosette was already making shallow cumulus clouds during this time. There appeared to be two distinct layers of cumulus there. I interpreted the lower layer to be due to heating and the upper layer to be a response to convection - perhaps outflow - to the North. When we got to the west to east leg of the rosette, we climbed into the bases of the lower layer and sampled those. At the center of the rosette, we proceeded on the northeast leg in and out of cumulus clouds (Figure 1).

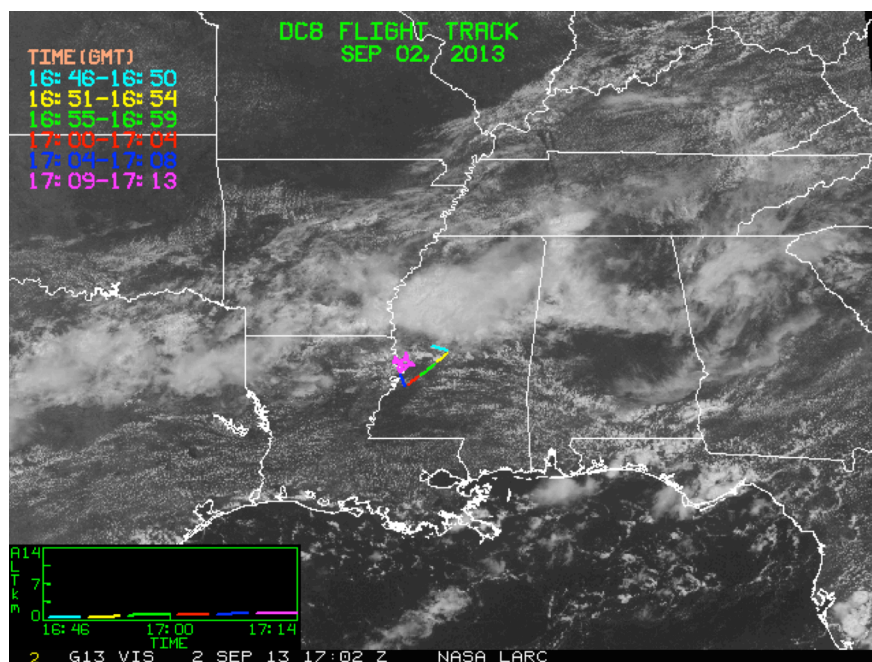


Figure 1. Image of the study region with the boundary layer sampling leg superimposed.

About this time we decided to climb to approximately flight level 250 since convection was obviously beginning to deepen. I noticed lenticular-looking clouds above the aircraft (very interesting!) and obvious pileus clouds capping turrets. Our goal was to establish the rosette pattern at 250 but we

quickly began identifying turrets to penetrate and began attempting to characterize the

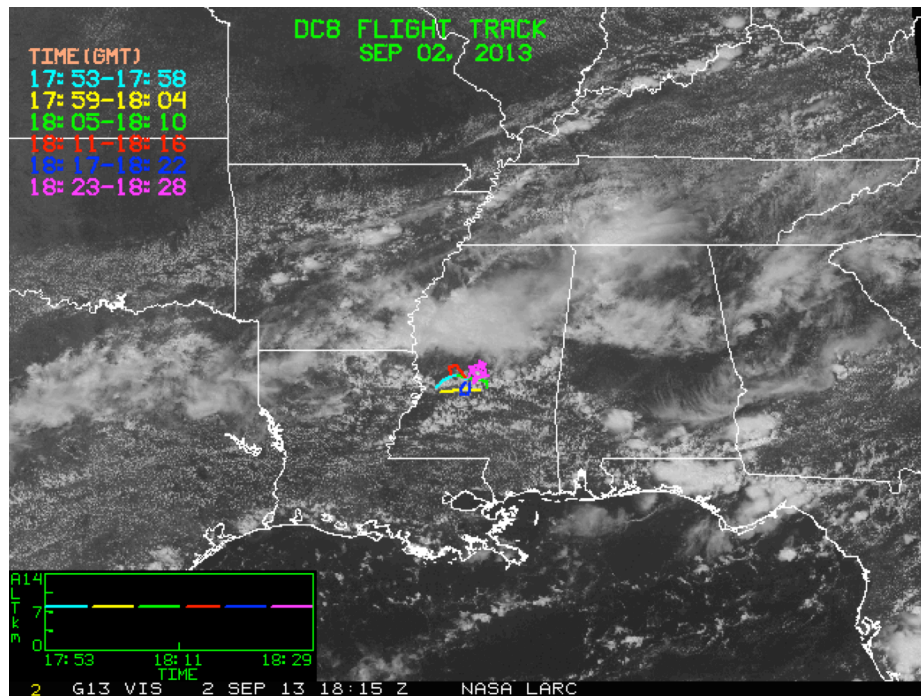


Figure 2. Initial sampling of convection along an east-west line.

convective environment by conducting repeating lines through identified turrets. The Lear eventually began sampling in the region. The Lear and DC8 were somewhat disjointed with the DC8 southeast of the rosette center 30-40

miles and the Lear working 20 miles or so east of the center. The properties of the turret penetrations included liquid droplets, pristine ice, and some aggregates as reported by SPEC. APR2 began acquiring good radar return in the higher turrets but was not sensing return in the congestus that I could see below the DC8. We repeated several turrets along a flight line that was roughly east to west (Figure 2). We then attempted to head back to where the Lear was working. Somewhere in this area we identified a target that the DC8 would not penetrate due to their radar return. We marked that position and decided to make that a target, reasoning that it would eventually produce an anvil. After a few more random penetrations of turrets west of the rosette center on a wide turn we returned to the intense target after approximately 20 minutes or so. This region then had significant activity and we repeated on random lines that brought us back to this region - we eventually named this complex Tammi for easy identification. The Lear eventually joined us below in this region. We climbed to flight level (FL) 300 and then FL 350 during this time. The convection was evidently producing outflow with DC8 SPEC reporting aggregates and less liquid water. Chemists were reporting signatures of outflow. Views out the window showed a field of congestus below with higher turrets to at or above our flight level. Outflow from mature convection were obvious on many of these with anvil structures that extended more or less eastward.

After repeated runs through the Tammi region we noticed that the ER2 as working a long line that ran a little north of east. The Tammi convection had peaked based on our interpretation of what we could see from satellite, out the window, and from APR2. We

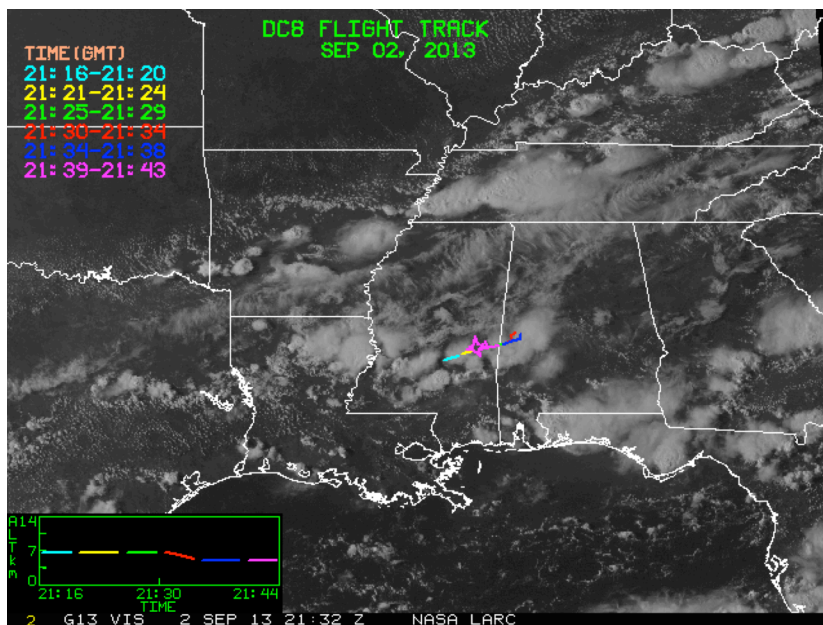


Figure 3. A section of the track that was coordinated with the ER2. A descent to approximate outflow bases took place at this time.

well defined. We rejoined the line heading east and descended to FL 250 or 200. When the ER2 overtook us east of the Tammi outflow as we headed eastbound we had cirrus above and I could see the surface below.

decided to attempt to join the ER2 line and this eventually happened. Running well to the east in cloud with the ER2 at FL 350, we entered an area of obvious stratiform rain with APR2 reporting echo to the surface and a bright band. Coming back westbound, it was easy to correlate the clouds we were in with the satellite imagery. The cirrus were quite variable and we attempted to find base by descending. Base was ragged and not

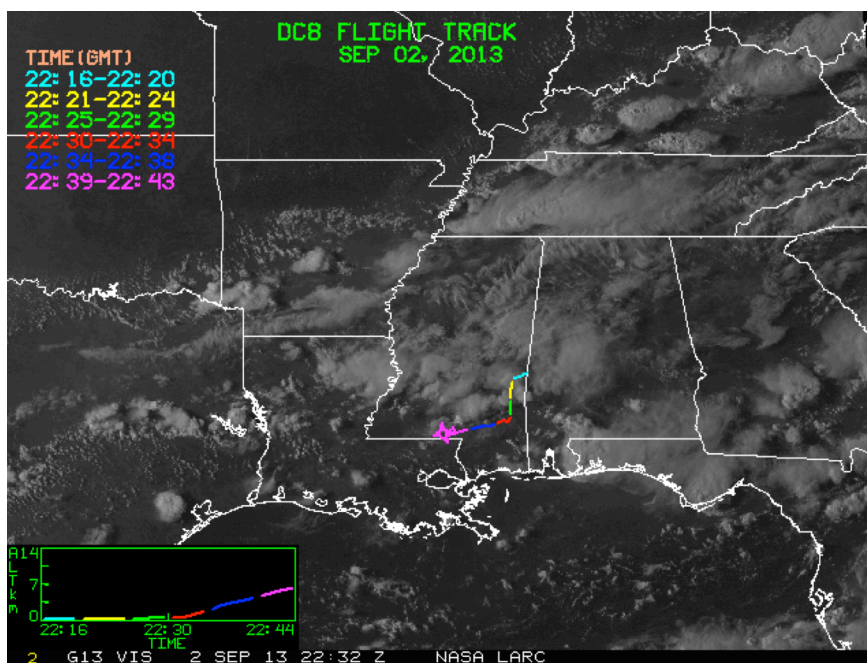


Figure 4. Track southbound in the boundary layer.

After what seemed to be a good radiation run, we broke off from the ER2 and headed westbound back to the Tammi area to do more remote sensing of the outflow that was now above us. We descended eventually to near the freezing level to look for cloud there. We

identified a region of cumulus near the freezing level (bases at 150 or so with tops not more than a few hundred meters above that) and eventually spent about a minute sampling these clouds in the Tammi region. From here we descended to the boundary layer and made a long run to the east at 1000 feet coming eventually back to the Tammi region. From here we headed southbound to try to find the boundary of the cold pool (Figure 4). This was successful as we crossed a line of weak convection heading south. This ended the convection sampling.

All the goals for this flight appeared to have been achieved. The properties of the pre convection boundary were sampled, a region of active convection was characterized over a period of several hours with remote and in situ sampling including coordination with the SPEC Learjet. Coordinated flight with the ER2 was achieved. In addition, a region post convection clouds was sampled near the freezing level and the post convection boundary layer was observed.

Imagery provided by Rabi Polikondra